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An Appalachian Species of *Rhysodesmus* (Polydesmida: Xystodesmidae: Rhysodesmini)

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ABSTRACT

Rhysodesmus restans is described from a series of specimens collected near Mendota, Washington Co., Virginia. This genus is otherwise known from Texas to El Salvador, in which region it has undergone extensive diversification. The presence of a species in the Appalachian region not only confirms that area as its probable source but implies that the genus had already achieved its present characters prior to migrating south and westward.

INTRODUCTION

Millipeds have long been appreciated as a group of animals almost without equal as resource material for biogeographic research. Utilization of this potential has, however, hitherto been constrained by two correlated factors: the still inadequate state of group taxonomy and the lack of comprehensive collecting in most parts of the world.

Despite substantial progress towards improvement of both areas of deficiency, at least in North America, there continue to be remarkable surprises resulting from collecting (often random and opportunistic) in even fairly well-sampled regions. The case to be presented in the following pages is a classic example of this phenomenon, one which suggests that field work during apparently inclement weather and in unpromising locales is an approach likely to yield rich rewards.

As part of an ongoing inventory of the soil and litter fauna of Virginia, staff members of the Department of Recent Invertebrates, Virginia Museum of Natural History, installed a pitfall-drift fence array in a somewhat unpromising site not far from Mendota, Washington Co., Virginia., during July 1997. The first several

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recoveries of trapped arthropods confirmed initial impressions that the location was not optimal and should be abandoned. However, material removed on 3 December contained 14 adult males of an unfamiliar milliped which on laboratory inspection proved to represent a species of the xystodesmid genus *Rhysodesmus*.

Rhysodesmus is virtually a hallmark of the Middle American fauna, having occupied the entire area from west Texas to El Salvador with an exuberant burst of diversification. So far, over 70 species have been described from that region, which it shares with only one other xystodesmid genus - the obviously derivative small taxon *Stenodesmus*. That *Rhysodesmus* had its roots in eastern United States was implied, however, three decades ago, in my revision (1965: 345) of the allied genus *Boraria*, and more emphatically asserted a few years later in my paper about the Appalachian milliped fauna (1969: 237). This line of affinity was surmised on the basis of general similarity between *Rhysodesmus* and *Boraria*, but can now be affirmed in an uncontroversial way by the discovery of a species, clearly referable to *Rhysodesmus* in gonopod characters, in southwestern Virginia.

Although the description of individual new species of millipeds is normally to be avoided, the biogeographic and phylogenetic implications in this instance seem to warrant a dispensation, in order to reveal both the disjunct taxon and to emphasize the value of "off-season" collections.

Rhysodesmus restans, new species
Figures 1 - 4

MATERIAL: ♂ holotype and five ♂ topoparatypes (Va. Mus. Nat. Hist.), eight additional ♂ paratypes in NCSM, USNM, AMNH, ZMH, MHNP, ZMC (and others) from hillside off Cty Rte 620, ca 300 m NE of jct with Cty Rte 614 [= 3 km NE of Mendota], Washington Co., Virginia, November 1997.

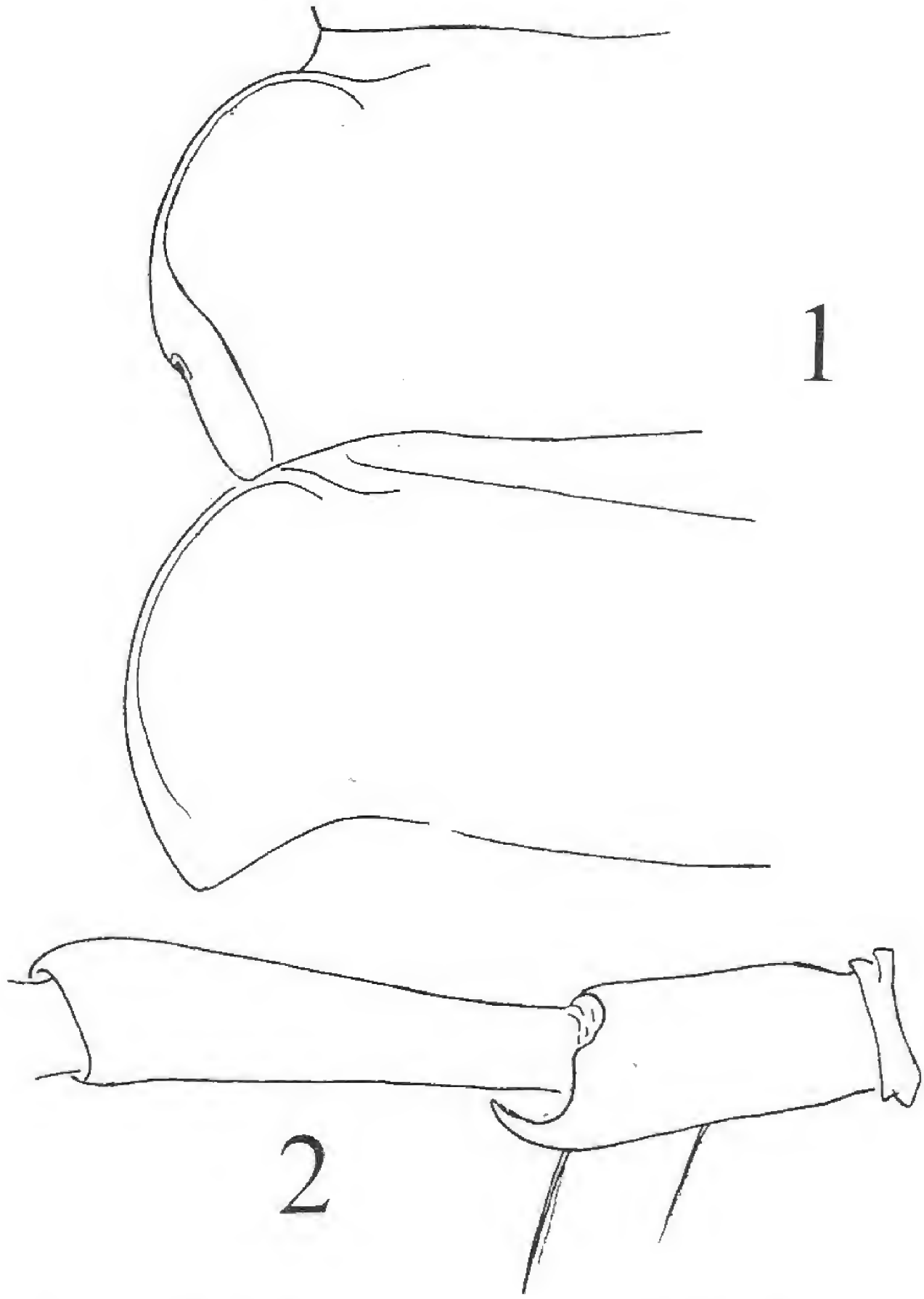
NAME: Derived from the Latin stem *resto-* with the implied meaning "one who remains behind".

DIAGNOSIS: A small species of the genus, total length 22-24 mm; antennae with four apical sensory cones; metaterga smooth and polished, paranota relatively small and declivent, sterna broad, unspined, prefemora with apical spine only on legs of last several segments, curved upward. Gonopods of form typical of the genus, prefemoral process longer relative to telopodite length than in other species. Coloration dilute fuscous dorsally, with paranotal spot, legs, antennae, and sterna a pale yellowish-white.

HOLOTYPE: Adult male, length, 23 mm., nearly parallel-sided along most of body, width across paranota of segments 6-16, 4.6 mm., W/L ratio, 20%.

Pigmentation very reduced, dorsal color generally a pale yellowish-brown, most terga with darker transverse band across anterior half of ech metatergum and region of stricture; legs, antennae, and underparts uniformly pale testaceous to white.

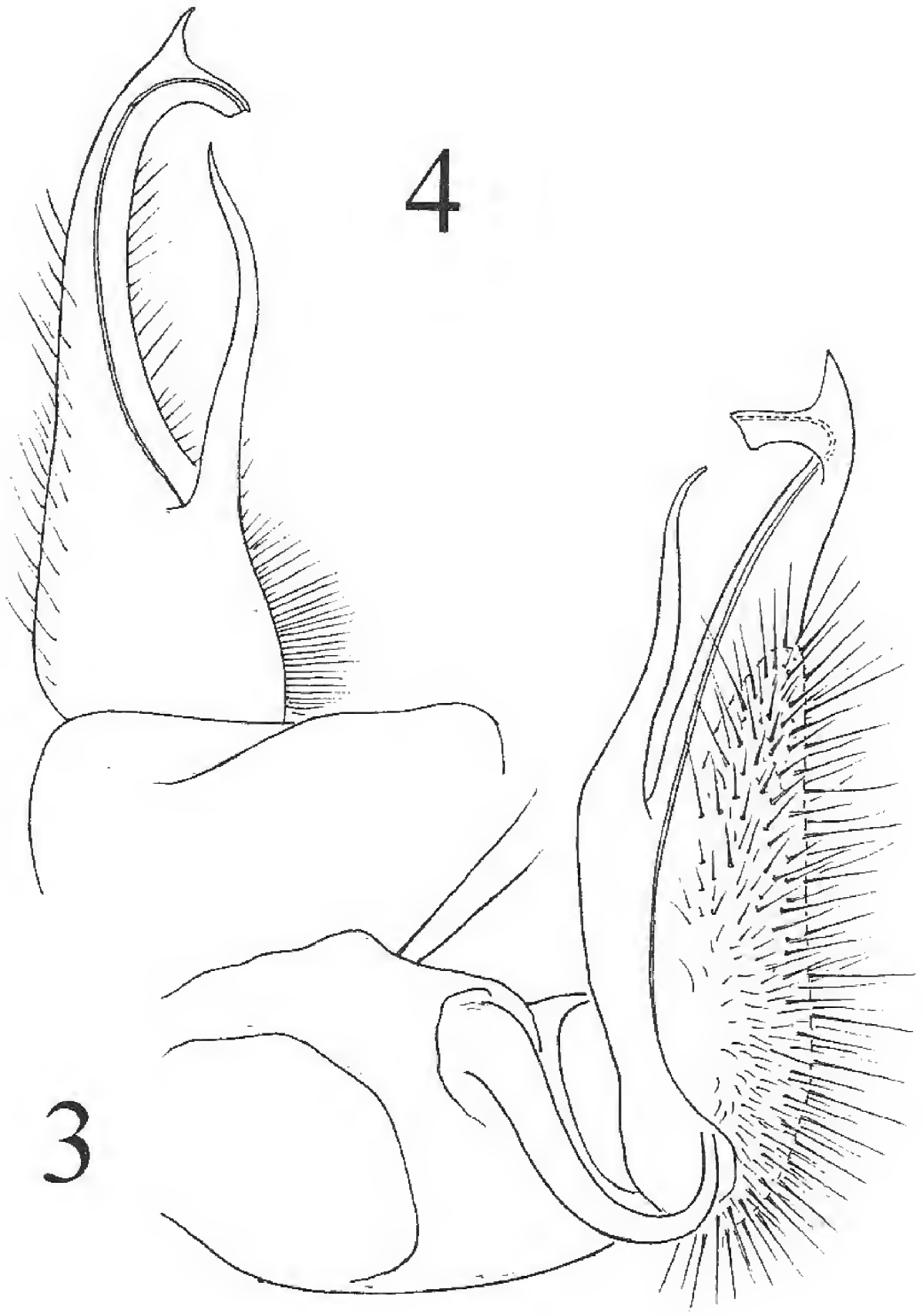
Head smooth and polished, epicranial and interantennal grooves prominent; 2+2 epicranial setae, 1+1 upper frontal, 1+1 lower frontal, and about 12-15 marginal genal setae. Interantennal isthmus about = to 2nd antennomere (1.0 mm).



Figs. 1,2. *Rhysodesmus restans*, n. sp. 1, left paranota of segments 10 and 11, dorsal aspect. 2, basal podomeres of leg from 18th segment.

Surface of collum and all tergal areas smooth and polished, dorsum convex with paranota declivent and continuing curvature of midbody. Shape of paranota at midbody as in Figure 1. Stricture obscure, only anterior edge defined dorsally; rim of scapulorae not continued mesad beyond base.

Epiproct and associated elements of normal configuration. Sterna flat, glabrous, not produced into subcoxal lobes or spines, at midbody about as wide as length of femur (each 1.0 mm). Legs relatively long, tarsi visible beyond sides of body; prefemoral spines present only on legs of last three or four segments, but there apically curved upward (Fig. 2).



Figs. 3,4. *Rhysodesmus restans*, n. sp. 3, left gonopod, mesal aspect. 4, the same gonopod, dorsal aspect.

Anterior legs not notably thickened or otherwise modified. Gonopod aperture transverse oval, about twice as wide and median length, with narrow raised rim posteriorly. Gonopods (Figs. 3,4) of form typical of the genus, but prefemoral process longer than in Mexican species for which the character is known.

HABITAT: The entire type series was taken from a drift fence-pitfall array placed on a fairly steep, west-facing hillside on limestone substrate. The thin forest cover was a mixture of second (or third) growth black locust, white pine, oak, and red maple, suggesting a successional stage from a cleared field, probably a former pasture. At the time of installation, the site did not appear to be propituous for millipeds, an interesting reflection on their predictability.

COMMENTARY

As noted in an introductory paragraph, the Appalachian-Ozarkian genus *Boraria*. has been suggested on several occasions to be the closest living relative of *Rhysodesmus*. Southeastern United States generally is known to be the center of diversity for the tribe Rhysodesmini, which includes (in addition to *Boraria)* the regional genera *Pleuroloma*, *Cherokia*, *Gyalostethus*, *Erdelyia*, and provisionally *Caralinda*, *Gonoessa*, and *Lourdesia*,. These taxa are (1) quite distinct from each other in terms of gonopod structure, and (2) either monotypic or with only three or four species.

In contrast, *Rhysodesmus* is exceptionally speciose and extremely variable in size, color, body form, and external details, while the basic gonopod pattern remains relatively constant (as true for the other rhysodesmine genera). Throughout part of the generic range an interesting specialization occurs sporadically: an increase in the number of antennal sensory cones from the normal four to as many as 20. This modification occurs also in some genera of the family Gomphodesmidae, but is unknown elsewhere amongst Polydesmida. A second genus, *Stenodesmus*, occurs also in Mexico, chiefly the Caribbean side, and appears to be a derivative of *Rhysodesmus* in which the subapical telopodite spur is missing. Most (but not all) of the known species of *Stenodesmus* are further specialized by the reduction of the ozopore formula, in one case such pores are only on the 5th segment. Assuming *Stenodesmus* to be monophyletic, I am unable to suggest any known species of *Rhysodesmus* as a possible ancestor (which, of course could be one long extinct). The proliferation of *Rhysodesmus* in Mexico, resulting in species which differ substantially in peripheral features while maintaining a uniform gonopod configuration, led me to suspect many years ago that the genus was a recent arrival in an area unoccupied by other xystodesmids, and was in a "young" stage of an evolutionary cycle in which selection was affecting body form almost to the exclusion of male genitalia. Because of the greater generic diversification of the Rhysodesmini in eastern United States, I further concluded this to be the source area from which the ancestors of *Rhysodesmus* migrated southwestward.

In terms of both peripheral and genitalic features, there can be little doubt that *Boraria* represents the existing genus most likely to represent the sister-taxon. In-

deed, if the known species of that genus occurred in Mexico, conservative systematists might consider them members of *Rhysodesmus* randomly derived by loss of the subapical gonopod process. If the presence or absence of that process represents the major (?only) distinction between the two, its loss from the Appalachian species of *Boraria* would have to be considered apomorphic; its retention in *Rhysodesmus* plesiomorphic. And the same definition would apply to the loss in *Stenodesmus* (itself, ergo, a Mexican homolog of *Boraria*).

Two geographically disjunct members of this general complex warrant notice: *Boraria profuga* (Causey) in the Ouachitas, and *Stenodesmus tuobitus* (Chamberlin) in southcentral New Mexico. Both are only arbitrarily placed in their respective genera, substantially in deference to their geographic location. Of these, *profuga* is quite possibly only paraphyletically related to its Appalachian relatives.

S. tuobitus has been placed in *Nannaria, Stenodesmus*, and *Cibularia* (which it shared briefly with *profuga*). This situation is one which to which application of molecular techniques would seem highly appropriate, as traditional characters have probably been much affected by random parallel modification.

In any event, the occurrence of *R. restans* in the southern Appalachians implies clearly that the characters of this genus had been developed prior to the migration of at least one subgeneric lineage into Mexico. The subapical gonopod projection, lost in *Boraria, Gyalostethus*, and other Appalachia rhysodesmines, was retained in another closely related taxon, *Cherokia*, which differs primarily in the presence of a distinct cingulum between the prefemoral and acropodital regions of the gonopod and a subtriangular subterminal lobe on the mesal edge of the latter.

The species of *Rhysodesmus* geographically closest to *restans* are *textcolens* (Chamberlin) from the lower Rio Grande Valley, and *chisosi* Shelley, from the Big Bend area (Chisos Mountains) in western Texas (Shelley, 1989, fig. 1).

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